

Review of the genus *Pteranabropsis* (Anostostomatidae: Anabropsinae) with description of six new species

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Abstract

The genus *Pteranabropsis* is reviewed. Diagnostic characters for the superficially similar species of the genus are discussed. An extended key to the species is provided. Six new species are described: *P. angusta* sp. nov., *P. cuspis* sp. nov., *P. bavi* sp. nov., *P. copia* sp. nov., and *P. pusilla* sp. nov. from northern Vietnam, and *P. guadun* sp. nov. from the Wuyishan Mountains in China. Types and all other specimens from Vietnam are stored in ISNB Brussels; those from Wuyishan in ZFMK Bonn.

Keywords

China, diagnostic characters, dichotomous key, distribution, Orthoptera, Vietnam

Introduction

The genus *Pteranabropsis* was established by Gorochov (1988) for *Anabropsis carli* Griffini, 1911 from Vietnam. For eighty years, *Anabropsis carli* was the only named full-winged Anabropsinae from Asia. A more detailed treatment of the genus was given by Gorochov (1998) including a redescription of *P. carli*, description of a new species, *P. carnarius* Gorochov, 1998, and a differential diagnosis between adults and nymphs of both species and tools to differentiate between their juvenile stages and adults of the apterous genus *Apteranabropsis* Gorochov, 1988. Subsequently, Wang et al. (2015) described five new species from China, and Song et al. (2016) described two new species, also from China. Another similar, but micropterous, new species was described by Shi and Bian (2016) in a new but closely related genus *Brevipenna* Shi & Bian, 2016, which is intermediate between *Pteranabropsis* and *Apteranabropsis*.

A collection of Orthoptera obtained from studies of the entomological diversity of Vietnam (Constant and Grootaert 2018) contained a rich number of *Pteranabropsis* specimens from various localities in the northern area of Vietnam, including *P. carli* and *P. carnarius* from the type locality of the latter species (Tam Dao). Several other individuals of the genus collected in the course of that project differed significantly from both species and also from the species of the genus described from China. They are described here as new species. As the species of the genus show a great over-

all similarity, the differential characters had to be re-evaluated, resulting in an extended key to the species.

Additionally, historical specimens from Guadun (China), formerly identified as *P. carli* and found in the collection of ZFMK, are included in this study and it is proved to be a new species.

Materials and methods

The current study is based on specimens from the research project of "A step further in the Entomodiversity of Vietnam" managed by J. Constant (Constant and Grootaert 2018), housed in the Institut royal des Sciences naturelles de Belgique in Bruxelles.

During the study, I also re-examined two specimens of the genus from the old Klapperich collection held in ZFMK that were collected near Kuatun [current spelling Guadun] in the Wuyishan Mountains, China, in 1938.

A select number of the museum specimens were re-set to allow the studying of wing shapes and venation. Naming of tegminal veins follows Ingrisch (2018). That paper also contains a comparison with former schemes.

Documentation of the specimens studied was done by photography using a Canon D500 with a ring light mounted to a copy-stand for habitus images and a Canon D6 mounted to the photo adapter of a Motic M5 for microscopic images. The images were processed by CaptureOne and stacked with Zerene Stacker.

Abbreviations for depositories.—MHNG – Muséum d'histoire naturelle Genève, Switzerland; ISNB – Institut royal des Sciences naturelles de Belgique in Bruxelles, Belgium; ZFMK – Zoological Research Museum Alexander Koenig Bonn, Germany.

Results

Characters.—Body size, wing length, and wing surface or length to width ratio varies among species, although there is also variation among individuals, especially in the more widespread species. When the wings are spread, they are of some use for identification, especially in brachypterous species, since the wings were reduced to a varying degree, resulting in differences in length to width ratio. Coloration or intensity of coloration of hind wings

are occasionally helpful, too. Venation of tegmen follows a common pattern in all species, but in species with shortened wings, especially when the tegmen width becomes narrow due to reduction, the number of media or cubitus branches is reduced.

All three thoracic sternites possess a pair of elongate ventral projections. The metasternal projections differ rather strikingly among groups of species. They provide a useful character for identification and have been used in previous keys.

The male subgenital plate is basically similar in shape, but differs in details among species. Previous authors have used the presence or absence of an incision of the apical margin and the way it is incised as a key character.

The male phallus is fully membranous and lacks sclerites. Although it is structured and the structure is probably species specific, its shape is of restricted use for identification since in many museum specimens it is not preserved in a good enough condition for certain identification. Currently, only Gorochov (1998) has used it to differentiate between *P. carli* and *P. carnarius*. In the present paper it is illustrated for all species studied but not included in the key.

The most significant character for separating the species proved to be the apical area of the long paraproctal outgrowths in males when studied at sufficient magnification. One might speculate that these tools might be used to open the female subgenital plate during pairing, although that has not been observed so far.

The female subgenital plate has as its basic shape a triangular, somewhat vaulted basal area and a narrow prolonged apical area with acute tip. It differs between species by the relation of the length of the anterior to that of the posterior area and by presence or absence of minute modifications at the transient zone.

The presence or absence of spines on the ventral margins of the mid femur has been used in the keys of Wang et al. (2015) and Song et al. (2016). I avoided that character because of individual variation within species.

The tibial tympana are rather large and open on both sides in the basal area of the fore tibia. There is little variation among species. In *P. carnarius*, the open tympana are slightly but markedly smaller than in the equally large *P. carli*. The individuals of the genus are obviously able to hear although the prothoracic spiracle is not open and wide as in Tettigoniidae but covered by three valves and a little larger than the meso- and metathoracic spiracles that are covered by only two valves (Fig. 6C–D, M, R, V). Whether species in the genus can produce sound is unknown. No morphological modifications that could be interpreted as tools for sound production were found, but tremulation and drumming are known in US and New Zealand Anostostomatidae (Vandergast et al. 2017) and might also occur in *Pteranabropsis*. An interesting modification, as compared to the situation in Tettigoniidae, was found in the second plate of the mesopleuron, which is obtuse-angularly prolonged over its whole width, covers the intersegmental membrane, and overlaps at the tip with the metapleuron (Fig. 6C). A similar modification also exists in Gryllacrididae, but is shaped differently. The surface of the metapleuron is covered by transverse parallel riblets; also the anterior surface of the metapleuron and the surface of the mesopleuron are covered by fine and, on the mesopleuron, very weak transverse riblets.

Distribution of the genus in Vietnam.—An examination of all Orthoptera specimens collected at 21 localities during the project “A step further in the Entomodiversity of Vietnam” showed that *Pteranabropsis* specimens had been collected in seven localities, all of them in the northern area of Vietnam (Fig. 8). The collections from

central and southern areas of Vietnam investigated during that project did not contain any proof of the occurrence of the genus in those areas. The northern area is, however, somewhat better researched than the remainder of the country: there were twelve localities in northern, five in central, and four in southern Vietnam.

The number of voucher specimens of *Pteranabropsis* per locality varied between one and 14 specimens. The northern area of Vietnam appears to be a center of diversity for this Asian genus, as two additional species described from China, *P. karnyi* Wang et al. 2015 and *P. crenatis* Song et al. 2016, were found close to the border with Vietnam.

Four of the seven localities in which *Pteranabropsis* was found hosted two species of the genus, two localities had only one species, and one locality had three species.

Four of the seven species from Vietnam reported in this paper were found at a single locality, two species in two localities, and only one species, *P. carli*, in five localities. The latter species was also reported from nearby localities in southern China (Song et al. 2016).

Gorochov (1998) reported that at Tam Dao, *P. carli* and *P. carnarius* were found in the same vegetation on leaves and twigs in the undergrowth of forests. He assumed that they live a similar mode of life as “waiting predators”. On the other hand, one might assume that species with a similar way of life living together in the same habitat have at least some degree of specialization for using their environment. From the striking difference in the length of the tibial spines between these two species (compare Fig. 6A–B vs. J–K), one might assume that they could be adapted to prey of different size.

Taxonomy

Key to species of *Pteranabropsis* Gorochov, 1988

Remark: The Chinese species are included according to the descriptions and images in Wang et al. (2015) and Song et al. (2016).

- 1 Third thoracic sternite (metasternum) consisting of a pair of triangular plates with pointed apex. Hind margin of male subgenital plate truncate. Paraproctal outgrowths tapering apically, slightly exceeding hind margin of subgenital plate, with apex acute and strongly diverging. Tibet *P. tibetensis* Wang, Liu & Li, 2015
- Either third thoracic sternite terminating into a pair of long cones (Fig. 2H–M) or, if consisting of a pair of triangular plates (Fig. 2N–P), then male subgenital plate with incision from apical margin (Fig. 2E–G) 2
- 2 Third thoracic sternite terminating in a pair of roughly triangular plates without or with only short apical cones (Fig. 2N–P). Male subgenital plate with incision from apical margin (Fig. 2E–G). Paraproctal outgrowths in subapical area not or only moderately widened or more strongly swollen and then gradually narrowing into tip; tip pointing slightly dorso-apicad (not strongly upcurved) with a minute sclerotised peg, pad, or rim at tip (Fig. 4E–K) 3
- Third thoracic sternite terminating in a pair of widened elongate plates with long roughly cylindrical apical area or more strongly widened at base and step-like narrowed into narrow apical area (Fig. 2H–M). Male subgenital plate with apical margin truncate or slightly concave, without incision (Fig. 2A–D). Paraproctal outgrowths at end strongly upcurved forming a projection narrowing toward tip, terminating into a minute stiffened tooth, pad or rim at tip (Figs 3A–N, 4A–D) 11

3 Hind wings for the most part dark brown (Fig. 1J). Paraproctal outgrowths in subapical area with a distinct subapical ventral widening that acute-angularly narrows towards tip; at tip with a minute, compressed, sclerotised pad (Fig. 4E–G). Ventral spines of fore tibia very long, distinctly longer than in most other species of the genus; longest spines 3.1–3.3 × longer than the width of the tibia (Fig. 6J–K).....
.....*P. carnarius* Gorochov, 1998

– Ventral spines of fore tibia less prolonged, less than three times the width of the tibia; longest spines 2.2–2.8 × longer than the width of the tibia in Vietnamese species. Hind wings often greyish or brownish, subtransparent (Fig. 1H–I). Paraproctal outgrowths of different shape, in subapical area only slightly or not at all widening..... 4

4 Male subgenital plate with apical incision U-shaped (Fig. 2E–F) or rimiform..... 5

– Male subgenital plate with apical incision V-shaped (Fig. 2G) 7

5 Paraproctal outgrowths in middle narrowed, in subapical area faintly widened and lateral surface slightly swollen, narrowing as an elongate oval object towards rounded tip that carries a minute sclerotised pad (Fig. 4H–I). Posterior area of subgenital plate faintly widening apically, with U-shaped incision from apical margin (Fig. 2F). Female subgenital plate with narrow apical area very short, less than half the length of the triangular anterior area (Fig. 5H). Medium sized species (body male 25 mm, tegmen male 40 mm, tegmen female 34 mm). North Vietnam.....*P. pusilla* sp. nov.

– Paraproctal outgrowths without subapical widening, only faintly curved dorsad. Chinese species..... 6

6 Tip of metasternal lobes with a very short cone. Posterior margin of male subgenital plate with a very narrow incision (rimiform). Paraproctal outgrowths in apical area faintly sinuate but of sub-equal width as preceding area; tip membranous, triangular with a stiffened apical rim (after fig. 2E in Song et al. 2016). Female subgenital plate with narrow apical area shorter than triangular anterior area (about half as long). Large species (body male 33–35 mm, tegmen male 44–47 mm, tegmen female 49 mm after Song et al. 2016). China (Hubei, Guangxi, Chongqing, Guizhou).....*P. crenatis* Song, Bian & Shi, 2016

– Posterior margin of male subgenital plate with a U-shaped incision. Posterior area of subgenital plate rather strongly widening apically. Paraproctal outgrowths largely surpassing tip of subgenital plate, from ventral side with obtuse tips (after drawing 9 in Wang et al. 2015, the exact shape was not described). Large species (body male 33 mm, tegmen 41 mm after Wang et al. 2015). China, Yunnan.....
.....*P. tenchongensis* Wang, Liu & Li, 2015

7 Male subgenital plate with apical margin oblique but straight on both sides, in middle with a V-shaped incision with convex margins and obtuse bottom (Fig. 2G). Paraproctal outgrowths in subapical area not widened, only slightly curved dorsad; tip rounded, has a minute sclerotised lamella (Fig. 4J–K). Narrow apical process of female subgenital plate slightly shorter than triangular basal area and with subparallel margins; only in apical third narrowed to acute tip ..*P. guadun* sp. nov.

– Different combination of characters 8

8 Metasternal lobes acute triangular. Posterior margin of subgenital plate with V-shaped incision (after fig. 11 in Wang et al. 2015; in text described as "U-shaped"). Posterior area of subgenital plate not or at most faintly widening apically. Paraproctal outgrowths in subapical area straight with acute out-curved tips (after fig. 11 in Wang et al. 2015)*P. karnyi* Wang, Liu & Li, 2015

– Different combination of characters 9

9 Lateral margins of male subgenital plate not parallel in apical half. Paraproctal outgrowths in subapical area slightly sinuate but only faintly widened, at tip with a minute thorn or lamella (after fig. 6D in Song et al. 2016).....*P. infuscata* Wang, Liu & Li, 2015

– Lateral margins of subgenital plate parallel in apical half 10

10 Incision of posterior margin of subgenital plate shallow, only reaching one sixth of subgenital plate length; occiput with three longitudinal brown stripes (after figs 1D, 7C, F in Song et al. 2016). Paraproctal outgrowths in subapical area straight with obtuse tip (after fig. 17 in Wang et al. 2015) or faintly upcurved but not widened with acute tip pointing dorso-posteriorly (after fig. 7E–F in Song et al. 2016) ...
.....*P. parallela* Wang, Liu & Li, 2015

– Incision of posterior margin of subgenital plate deep, about a quarter of subgenital plate length; occiput with five irregular longitudinal brown stripes (after figs 1B, 3D, F in Song et al. 2016). Paraproctal outgrowths in subapical area rather strongly upcurved but not widened, terminating in a conical tip (after fig. 3E, G in Song et al. 2016)*P. incisa* Song, Bian & Shi, 2016

11 Long-winged species; wings distinctly surpassing hind knees of stretched hind legs; tegmen wide (Fig. 1A). Hind wings when spread about 1.8 × wider than long. Male paraproctal outgrowths with dorsally expanded apical area oblique triangular with curved margins and with blunt tip that carries a narrow stiffened lamella at dorso-apical margin (Fig. 3A–D). Female subgenital plate with triangular basal area (1.25–1.45 × longer than wide at base) rather gradually changing into the narrow apical area (Fig. 5A–C)
.....*P. carli* (Griffini, 1911)

– Brachypterous; wings reaching or only slightly surpassing hind knees of stretched hind legs; often not reaching tip of ovipositor (Fig. 1B–G). Male paraproctal outgrowths of different shape 12

12 Metasternal lobes with wide basal area more distinctly separated from cylindrical apical area (Fig. 2H, M). Tegmen wider, about 2.2–2.4 × longer than wide (Fig. 1C–E). When spread, hind wings appear semi-circular with straight fore margin (about 1.4 × wider than long). Dorsally expanded apical area of male paraproctal outgrowths elongate with proximal and distal margins less strongly converging, at tip truncate and provided with a narrow sclerotised lamella; distal margin substraight to faintly concave (Fig. 4A–D). Female subgenital plate moderately wide at base, the elongate-triangular basal area longer than the narrow apical area; at the transition zone between both areas with a pair of narrow, elongate lateral depressions separated by a narrow ridge in between (Fig. 5D–F)*P. copia* sp. nov.

– Metasternal lobes gradually narrowing from the wide basal to the cylindrical apical area (Fig. 2I–L). Tegmen narrower, 2.6–2.9 × longer than wide. The spread hind wings appear semi-oval with straight fore margin (about 1.7–1.8 × wider than long) 13

13 Metasternal lobes with the cylindrical apical area very stout, not distinctly separated from wider basal area, external margin convex or straight (Fig. 2L). Male paraproctal outgrowths in apical area only slightly widening dorsad and at dorsal angle provided with a small, dorso-ventrally compressed projection pointing apicad and carrying at tip a stiffened pad; ventral margin of outgrowth with apical angle widely rounded in lateral view; hind margin of outgrowth in apical view truncate and somewhat widened (Fig. 3J–N)*P. angusta* sp. nov.

– Metasternal lobes with the cylindrical apical area less stout, external margin in the transient zone between wide basal and narrow apical area concave (Fig. 2I, K) 14

14 Rather robust species with narrow fore wings ($2.9 \times$ longer than wide), hind wings more strongly reduced (Fig. 1B). Male paraproctal outgrowths in apical area with a large, acute-triangular dorsal projection that terminates into a minute stiffened pad; hind margin of outgrowth in lateral view slightly concave, at ventral angle narrowly rounded (Fig. 3E–I) *P. cuspis* sp. nov.

– Fore wings wider ($2.6\text{--}2.7 \times$ longer than wide), hind wings less reduced, when spread more cycloid (Fig. 1G). Female subgenital plate moderately wide at base, the elongate-triangular basal area longer than the narrow apical area; at the transition zone between both areas the lateral margins are suddenly constricted such that the narrow apical area has nearly subparallel margins and only at end narrows to acute tip (Fig. 5G) *P. bavi* sp. nov.

Description of taxa

Pteranabropsis Gorochov, 1988

Type species.—Type species: *Anabropsis carli* Griffini, 1911.

Description.—Large to medium sized species (Fig. 1). General color dark brown to black with irregular light pattern. Head large, ovoid; forehead subsMOOTH with very fine transverse striaTion. Fastigium verticis swollen and elevated, surface smooth, with faint depression along midline; lateral ocelli on lateral surfaces of elevation. Face with fastigium frontis separated by a transverse furrow from fastigium verticis. Pronotum with well-defined rim; without lateral angles separating disc from paranota; with indication of a transverse furrow separating a slightly swollen, dorsally flattened, posterior area from funnel-shaped anterior area; anterior and posterior margins substraight in middle, ventral margins convex; hind margin of paranota with humeral angle simply rounded. Prosternal lobes near base compressed triangular, afterwards long spiniform, thin; mesosternal lobes in basal area wide, afterwards elongate, conical to nearly cylindrical with obtuse tip; metasternal lobes varying between species, forming either a simple, roughly triangular plate or with a long sub-cylindrical apical extension (Fig. 2H). Abdomen without stridulatory teeth. Wing length varying among species from slightly longer than covering abdomen to largely surpassing knees of stretched hind legs. Venation of tegmen in fully winged species with two radius and two media branches, cubitus anterior with three branches, cubitus posterior undivided, with 5–6 anal veins. In species with shortened wings the number of media and cubitus branches can be reduced. Fore coxa with a strong spine at swollen anterior surface; also mid-coxa with a smaller spine at anterior surface. Fore tibiae with large uncovered tympana on both sides (Fig. 6). Prothoracic spiracle with three covering valves (Fig. 6D, M, R, V), slightly larger than meso- and metathoracic spiracles that have only two covering valves (Fig. 6C). Number of spines on ventral margins of femora and hind tibiae somewhat variable between species. Fore and middle tibiae with 4 pairs of long spines and one pair of apical spurs on ventral margins (Fig. 6); anterior tibia with one long spine on dorsal inner and an apical spur on both margins, the inner (anterior) distinctly longer than the outer spine; mid tibia with two spines and one spur on dorsal outer and 2–3 spines and one spur on dorsal inner margins.

Male. Ninth abdominal tergite very short; with two short obtuse expansions on hind margin widely separated from each other. Tenth abdominal tergite also very short, with a pair of up-

curved hooks inserted just laterally of the expansions of ninth tergite. Paraprocts with a long roughly cylindrical process, its shape, especially the apical area, varies between species (paraproctal outgrowth, Fig. 3–4). Epiproct triangular with shallowly grooved or furrowed surface; tip subobtuse. Subgenital plate in widened basal area with upcurved lateral margins; central disc projecting with parallel or slightly diverging and straight or concave lateral margins; styli present (Fig. 2A–G). Phallus membranous (Fig. 7).

Female. Seventh abdominal sternite unmodified, longer than sixth sternite. Subgenital plate triangular with extended apical projection; shape somewhat variable between species (Fig. 5). Ovipositor elongate, moderately curved throughout; ventral valves shorter than dorsal valves; tip of dorsal valves obtuse, tip of ventral valves acute but hidden under dorsal valves; medial valves narrow, slightly shorter than ventral valves (Fig. 4L–O).

Etymology.—The genus name *Pteranabropsis* Gorochov, 1988 is derived from the name *Anabropsis* Rehn, 1901. The gender of *Anabropsis* is feminine, this should also apply to *Pteranabropsis*. However there are three species names with the masculine ending -us: *P. carnarius*, *P. parallelus*, and *P. infuscatus*. The Latin word *carnarius* means “meat eater” and can thus be regarded as noun in apposition. In contrast, the Latin word *parallelus* is an adjective and *infuscatus* a participle. Both names should be emended to the feminine forms *P. parallela* Wang, Liu & Li, 2015 and *P. infuscata* Wang, Liu & Li, 2015 (ICZN 1999, Agreement in gender, Art. 31.2 and 34.2).

Pteranabropsis carli (Griffini, 1911)

Figs 1A, 2A, 2J, 3A–D, 5A–C, 6A–E, 7A–F;
photos of holotype in OSF (Cigliano et al. 2018)
[urn:lsid:Orthoptera.speciesfile.org:TaxonName:20152](https://urn.nbn.se/resolve?urn=urn:lsid:Orthoptera.speciesfile.org:TaxonName:20152)

Holotype (male, not seen).—Vietnam: “Tonkin” (northern area of Vietnam) (Genève, MHNG).

Material examined.—Vietnam: Hoang Lien NP, $22^{\circ}21'N$, $103^{\circ}46'20"E$, 1–5.vii.2013, leg. J. Constant & J. Bresseel (I.G. 32.454), 2 females (Brussels, ISNB); Hoa Binh Prov., Cuc Phuong National Park, $20^{\circ}19'N$, $105^{\circ}36'30"E$, 11–18.viii.2010, leg. J. Constant & P. Limbourg (I.G. 31.668), 1 male (Brussels, ISNB); Ngo Luong Nat. Res., $20^{\circ}26'16"N$, $105^{\circ}20'15"E$, 25–30.vii.2016, leg. J. Constant & J. Bresseel (I.G.: 33.282 GTI project), 1 male (Brussels, ISNB); Nguyen Binh, Cao Bang, Phia Den (Phia Dén), $22^{\circ}34'N$, $105^{\circ}53'0"E$, 8.viii.2010, leg. J. Constant & P. Limbourg (I.G. 31.668), 1 female (Brussels, ISNB); Prov. Vinhfu, Tam Dao N.P., $21^{\circ}31'N$, $105^{\circ}33'E$, 25–28.viii.2010, leg. J. Constant & P. Limbourg (I.G. 31.668), 2 females (Brussels, ISNB); same locality, 25–30.vii.2011, leg. J. Constant & J. Bresseel (I.G. 31.933), 4 females, 2 males (Brussels, ISNB). Identification based on the description in Gorochov (1998).

Diagnosis.—*P. carli* is characterized by the long and moderately wide fore wings; the longest ventral spines of the fore tibia are more than twice as long as the diameter of the tibia. The genicular area of all legs is usually whitish, rarely slightly infumate. The paraproctal outgrowths have the apical area suddenly upcurved, are roughly triangular with the obtuse tip faintly curved posteriorly, and carrying along dorsal margin a fine, compressed, stiffened lamella. The female subgenital plate has the elongate triangular basal area with substraight to slightly concave lateral margins.

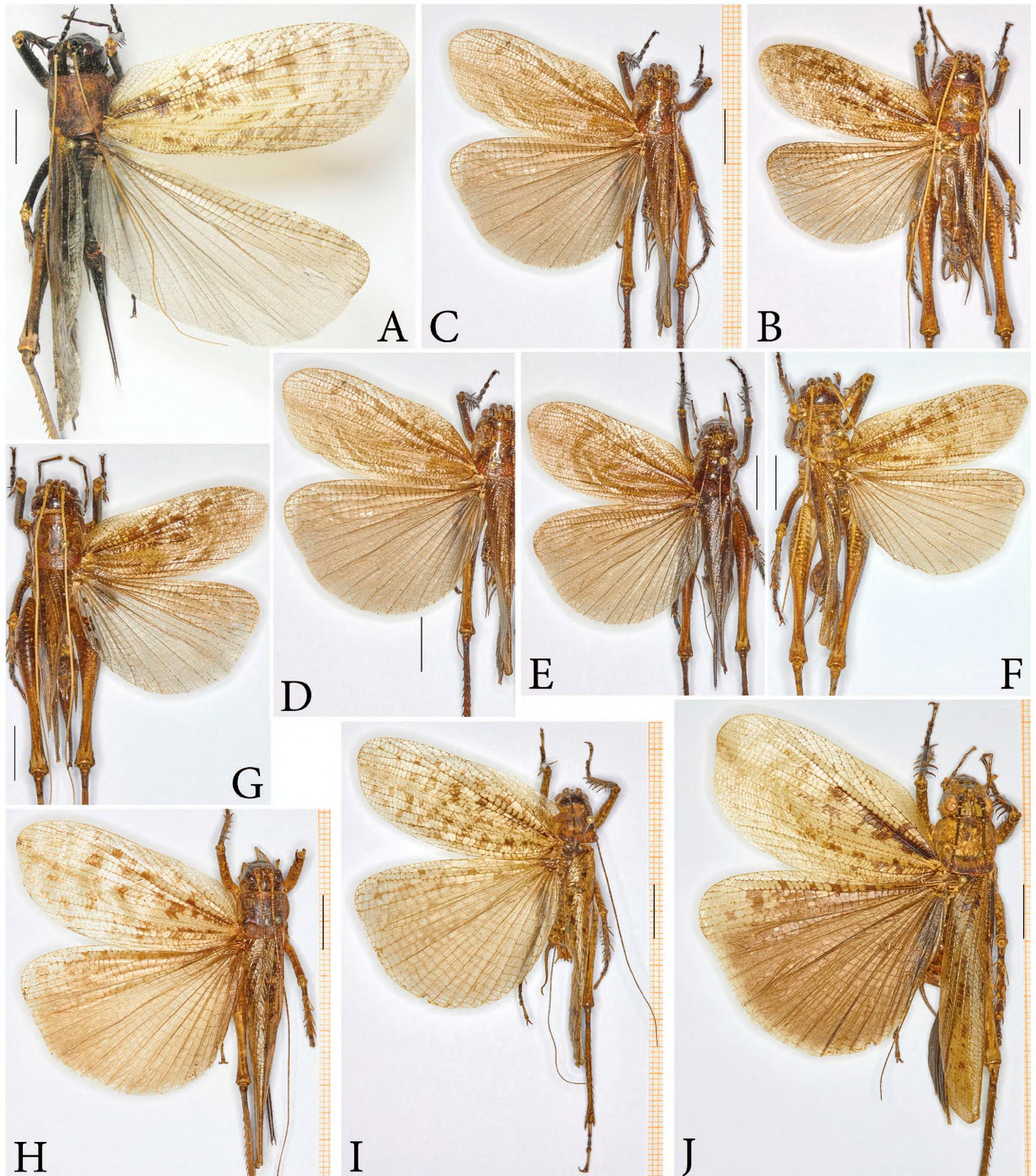


Fig. 1. Habitus dorsal view of *Pteranabropsis* species. A. *P. carli* (Griffini, 1911) female; B. *P. cuspis* sp. nov. male; C–E. *P. copia* sp. nov. male (C), female from Copia (D), and female from Hoang Lien (E); F. *P. angusta* sp. nov. male; G. *P. bavi* sp. nov. female; H. *P. guadun* sp. nov. female; I. *P. pusilla* sp. nov. male; J. *P. carnarius* Gorochov, 1998 male. Scales 10 mm.

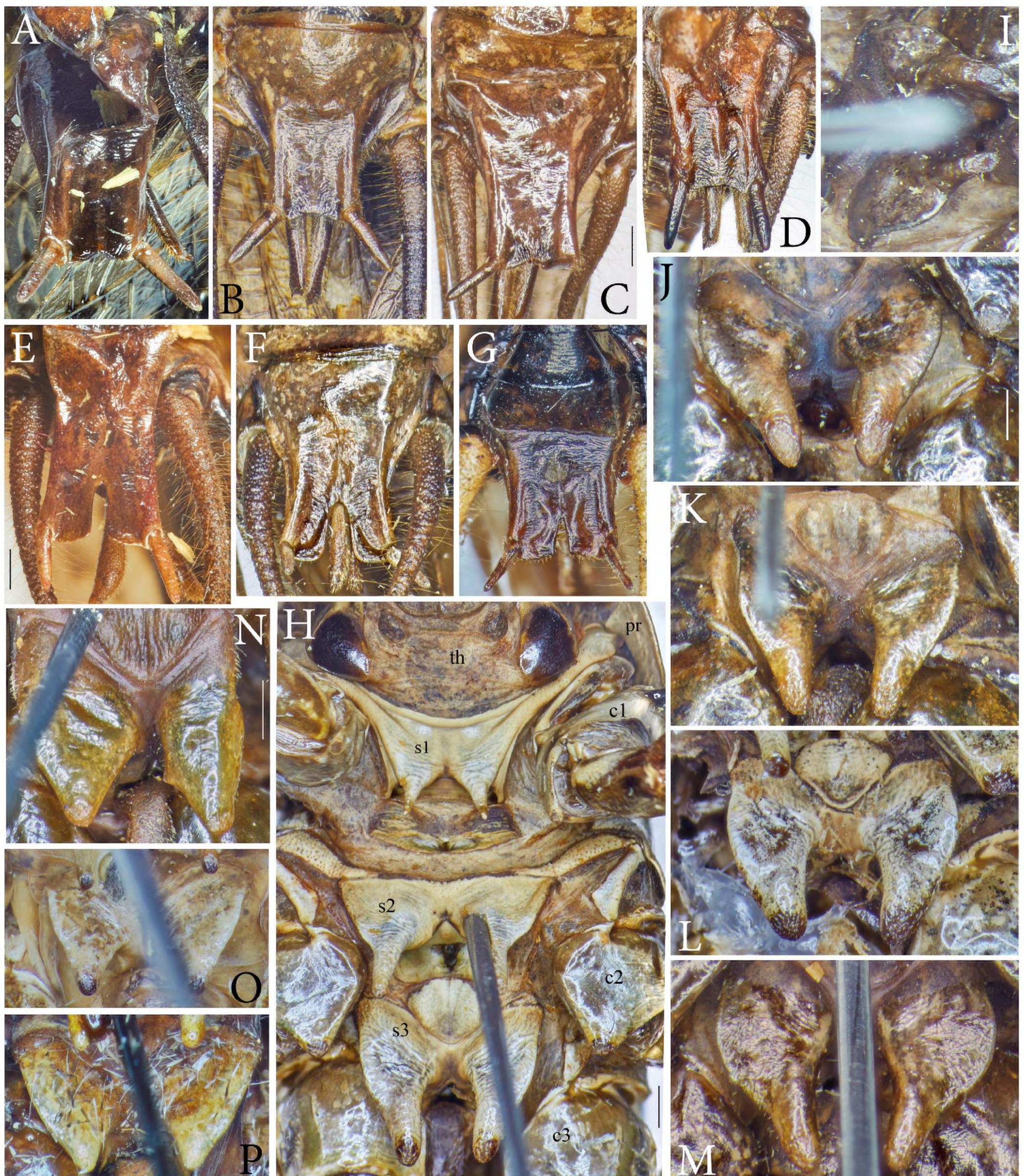


Fig. 2. A–G. Male subgenital plate; H. Thoracic sternites; I–P. Metasternum of *Pteranabropsis* species: *P. carli* (Griffini, 1911) (A, J); *P. cuspis* sp. nov. (B, H); *P. copia* from type locality (C, M); *P. angusta* sp. nov. (D, L); *P. carnarius* Gorochov, 1998 (E, N); *P. pusilla* sp. nov. (F, O); *P. guadun* sp. nov. (G, P); *P. copia* from Hoang Lien (I); *P. bavi* sp. nov. (K). Abbreviations: c1 – fore coxa, c2 – mid coxa, c3 – hind coxa, s1 – prosternum, s2 – mesosternum, s3 – metasternum, th – throat with lateral hemispherical sclerites and pair of papillae, pr – underside of pronotum. Scales 1 mm.

The narrow apical area is only slightly shorter than the basal area, about three quarters of the basal area.

Description.—Large species; habitus as genus. Prosternal lobes compressed triangular, at beginning of narrow conical apical area slightly constricted, tip subacute to subobtuse; mesosternal lobes in basal area wide, afterwards elongate conical to nearly cylindrical with subtruncate tip; metasternal lobes compressed, with concave internal and strongly convex external margins; gradually passing over into conical (nearly sub-cylindrical) apical area with obtuse tip (Fig. 2J).

Wings distinctly surpassing hind knees (Fig. 1A). Fore wings 2.3–2.8 × longer than wide. Venation: radius with radius sector arising in about mid-length of tegmen; media free, two-branched, branching behind basal third; cubitus anterior three-branched (CuA + CuPaα + CuPaβ after Béthoux 2012), branching in basal third and before mid-length; cubitus posterior (CuPb) undivided; with five anal veins, the last one incomplete. Hind wings cycloid, about 1.8–2.2 × wider than long.

Legs. Fore coxa with a strong spine at swollen anterior surface; and mid-coxa with a smaller spine at external (= anterior) margin. Fore femur with 3–5 small spines at anterior-ventral margin; mid femur with 3–5 spines at anterior-ventral and 6 smaller spines at posterior-ventral margin. Hind femora with 5–7 external and 4–5 internal small spines on ventral margins; hind tibiae with dorsal spines on inner margin larger than on outer margin, ventral margins with few minute spinules; on both sides with 4 apical spurs, the dorsal two pairs very large, the following pair medium, the ventral-most pair small; internal spurs larger than external counterparts; ventral margin with 2–4 external and 0–1 internal spinules.

Male. Paraproctal outgrowths long, roughly cylindrical with rugose and setose surface, apex obtuse with beaked extension with subobtuse tip that carries a fine, stiff lamella on top (Fig. 3A–D). Subgenital plate with lateral margins upcurved in basal area; ventral surface behind basal third with obtuse lateral carinae, nearly parallel in about apical third and little projecting behind apical margin; apical margin concave, on both sides with a substraight stylus (Fig. 2A). Phallus membranous (Fig. 7A–F).

Female. Subgenital plate acute-angled triangular in more than basal half, terminating into a long apical spine with regularly converging margins to acute tip; at transition between basal and apical areas sometimes slightly sloped (Fig. 5A–C).

Coloration.—Largely black or dark brown with fine and irregular light spots; pronotum reddish-brown or marbled with dark and light flecks; legs largely black with light, often white genicular areas, dorsal surface of fore and mid tibiae of lighter color; posterior half of hind femora and hind tibiae ochre. Face dark brown to black, marbled with numerous small lighter spots, in some specimens also with larger medium to dark brown areas; extension of light and dark areas variable. Tegmen semi-transparent, brown or blackish-brown with larger dark spots between subcosta and cubitus and smaller dark spots in anal area; in anterior area of lighter color. Hind wings semi-transparent with a trace of grey, in anterior area often brownish.

Measurements.—(5 males, 3 females). In mm. Body w/wings: male 65–72, female 65–66; body w/o wings: male 32–37, female 38–39; pronotum: male 8.5–9.5, female 9.5–10.2; tegmen: male 49.5–58.0, female 52.0–57.7; tegmen width: male 18.5–25.0, female 20.0–22.9; hind femur: male 31–34, female 34–36; antenna: male 90–100; ovipositor: female 26.

Pteranabropsis angusta sp. nov.

Figs 1F, 2D, 2L, 3J–N, 6H–I, 7K–N

<http://zoobank.org/D81AB88B-A1BE-4BB8-8248-5FA57BABA0D5>

urn:lsid:Orthoptera.speciesfile.org:TaxonName:505862

Holotype (male).—Vietnam: Hoa Binh Prov., Cuc Phuong National Park, 20°19'N, 105°36'30"E, 11–18.viii.2010, leg. J. Constant & P. Limbourg (I.G. 31.668) – (Brussels, ISNB).

Other specimens examined.—same data as holotype – 1 male (paratype) (Brussels, ISNB).

Diagnosis.—The new species is similar to *P. carli* but has shorter wings that reach, but do not surpass, the hind knees; the tegmina are narrower and the hind wings smaller. The genicular area of the hind legs is pale but not whitish as in *P. carli*. The main diagnostic character to differentiate this species from *P. carli* and other species of the genus is the shape of the apical area of the male paraproctal outgrowths that have the apical area up-curved as in *P. carli* but longer, near the end are dorso-ventrally compressed instead of laterally compressed, and carry at the tip a stiffened pad pointing apically instead of a dorsal stiffened margin. The curvature of the external margin of the metasternal lobes is stronger than that of the internal margin but markedly less strong than in other species of the genus with conically extended metasternal lobes. Further differences to other species are outlined in the key.

Description.—Medium sized species; habitus as genus. Prosternal lobes compressed triangular, subacute; mesosternal lobes in basal area moderately wide, afterwards elongate conical to nearly cylindrical with obtuse to subtruncate tip; metasternal lobes compressed, with concave internal and convex external margins; gradually passing over into conical, nearly sub-cylindrical, apical area with obtuse tip (Fig. 2L).

Wings just reaching hind knees (Fig. 1F). Fore wings 2.6–2.7 × longer than wide. Venation: radius with radius sector arising between middle and apical third of tegmen; media anterior fused or sub-fused in basal area with radius, separating near end of basal third. In one male the media then divides before mid-length into two branches and the cubitus anterior also simply divides before mid-length into two branches; in the other male on right tegmen only, media anterior, after separation from radius, fuses with a first branch of cubitus anterior and shortly after divides into two branches, while on this tegmen, cubitus anterior divides twice and the first anterior branch fuses with media and shortly after cubitus anterior divides again into two simple branches; cubitus posterior free and undivided, with 5 anal veins, the last one incomplete. Hind wings cycloid, distinctly wider than long (1.70–1.76 ×).

Legs. Fore coxa with a strong spine at swollen anterior surface and mid-coxa with a smaller spine at anterior margin. Fore and middle femora with 2–3 small spines at anterior-ventral margins. Hind femora with 7 external and 6 internal small spines on ventral margins; hind tibiae with dorsal spines on inner margin larger than on outer margin, ventral margins with few minute spinules; both sides with 4 apical spurs, the dorsal two pairs very large, the following pair medium, the ventral-most pair small; internal spurs larger than external counterparts; ventral margin with 2 external and 1 internal spinules.

Male. Paraproctal outgrowths long, roughly cylindrical, widening in apical area with dorsal margin upcurved, later straight

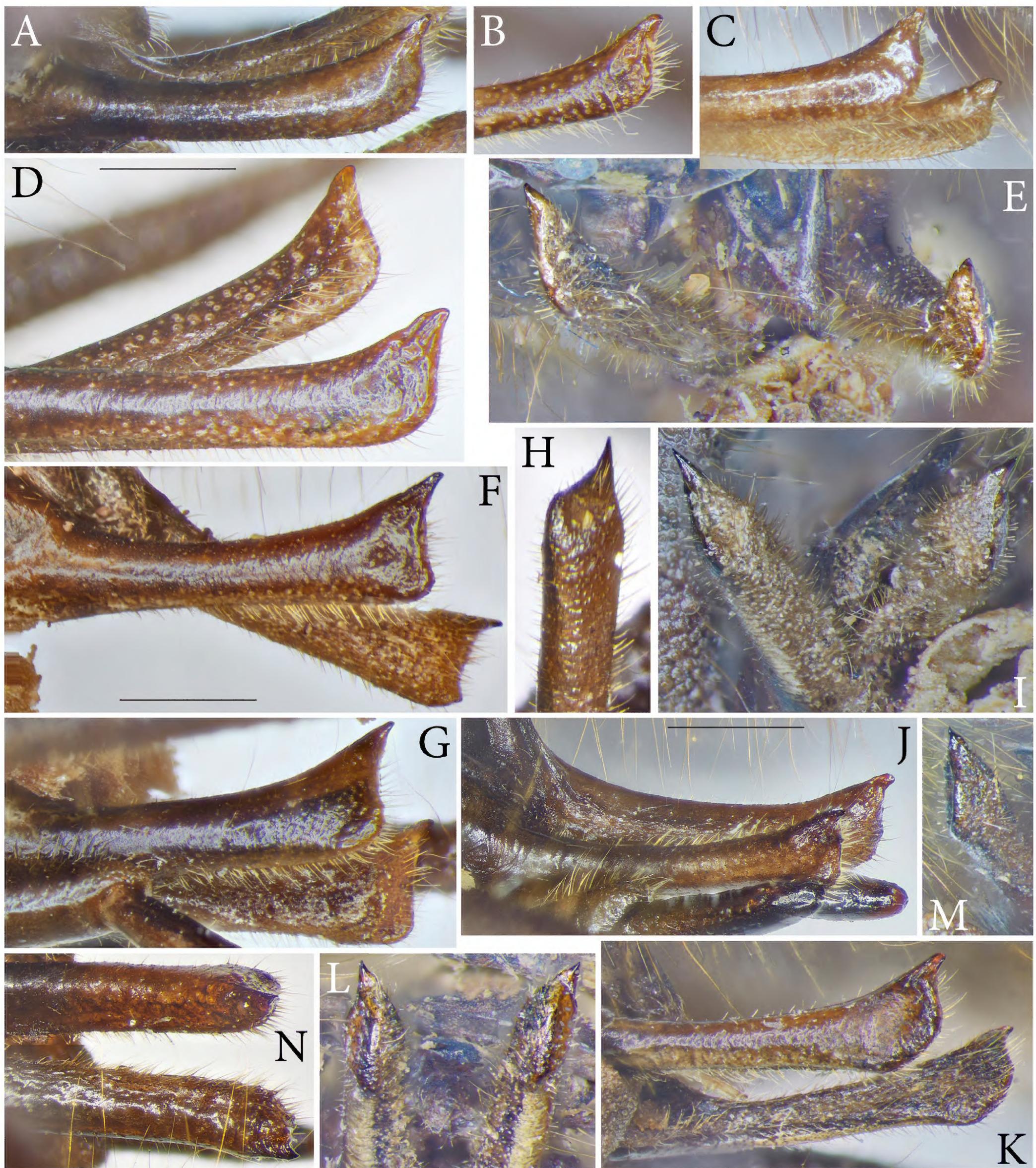


Fig. 3. Male paraproctal outgrowths in full or only apical area in lateral (A–D, F–G, J–K), apical (E, I, L, M), ventro-apical (H), and dorsal view (N). A–D. *P. carli* (Griffini, 1911) four males from Tam Dao (A–B), Cuc Phuong (C), and Ngo Luong (D); E–I. *P. cuspis* sp. nov. two males from Ngo Luong; J–N. *P. angusta* sp. nov. two males from Cuc Phuong. Scales 1 mm.

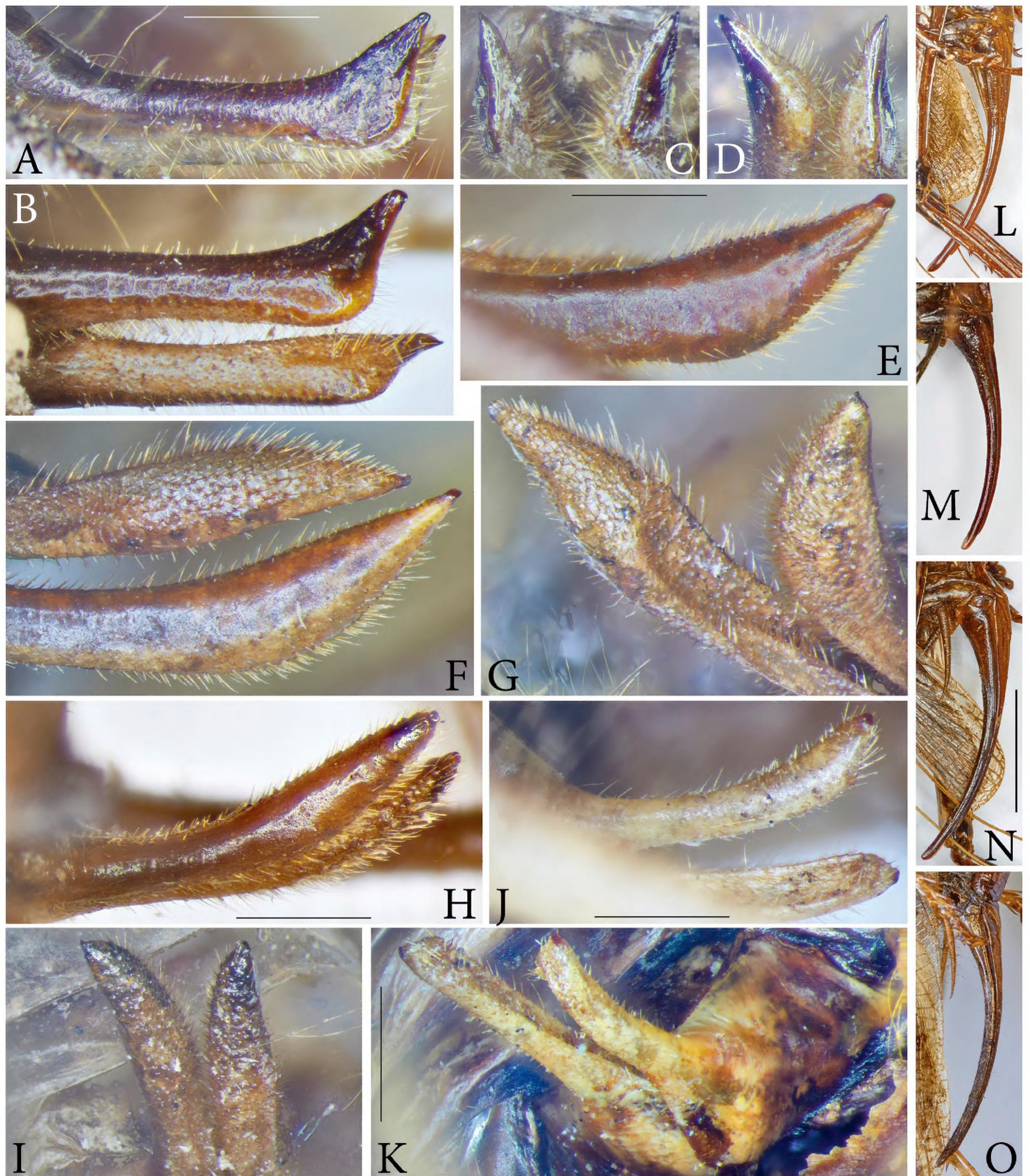


Fig. 4. A–K. Male paraproctal outgrowths in full or only apical area in lateral (A–B, E–F, H, J), apical (C–D, G), ventro-apical (I), and oblique apical view (K); L–O. Female abdominal apex with ovipositor in lateral view. A–D. *P. copia* (2 males); E–G. *P. carnarius* Gorochov, 1998 (two males from Tam Dao, in F the hindmost outgrowth is twisted upside down); H–I. *P. pusilla* sp. nov.; J–K. *P. guadun* sp. nov.; L–M. *P. copia* sp. nov. from Copia (L) and Hoang Lien (M); N. *P. bavi* sp. nov.; O. *P. guadun* sp. nov. Scales 1 mm, scale for ovipositor 10 mm.

and terminating into a compressed vertical lamella in dorsal area of apical margin, ventral margin broadly rounded (Fig. 3J–N). Epiproct elongate-triangular with slightly sinuate, stiffened and slightly elevated lateral margins. Subgenital plate with lateral margins upcurved and narrowing posteriorly; ventral surface behind basal third with obtuse lateral carinae, nearly parallel in about apical third; in apical area also with a faint median carina; apical margin concave, on both sides with a substraight stylus (Fig. 2D). Phallus membranous (Fig. 7K–N).

Female unknown.

Coloration.—Brown with light and dark spots. Face blackish-brown mixed with yellowish, pale to almost white spots; ocelli distinct. Tegmen semi-transparent, suffused with yellowish-brown except in anterior area, and provided with dark brown spots. Hind wings semi-transparent, slightly smoky.

Measurements.—(2 males). In mm. Body w/wings: 48; body w/o wings: 33–40; pronotum: 9.0–9.2; tegmen: 33.5–34.0; tegmen width: 12.5–13.0; hind femur: 31–32; antenna: 80.

Etymology.—The new species is named for its comparatively narrow wings; from Latin *angustus*, *angusta* narrow, slim.

Pteranabropsis cuspis sp. nov.

Figs 1B, 2B, 2H, 3E–I, 6F–G, 7I–J

<http://zoobank.org/79D26B42-B6EE-4CF1-BC2B-5581B9C8F2D8>

urn:lsid:Orthoptera.speciesfile.org:TaxonName:505863

Holotype (male).—Vietnam: Hoa Binh Prov., Ngo Luong Nat. Res., 20°26'16"N, 105°20'15"E, 25–30.vii.2016, leg. J. Constant & J. Bresseel (I.G.: 33.282 GTI project) – (Brussels, ISNB).

Other specimens examined.—Same data as holotype, 2 males (paratypes) (Brussels, ISNB).

Diagnosis.—The new species is similar to *P. angusta* sp. nov. but of more robust habitus. Tegmina and hind wings are of similarly shortened shape but slightly more reduced in *P. cuspis* sp. nov. Diagnostic for the new species is the shape of the paraproctal outgrowths, which resemble those of *P. carli* (Griffini, 1911) but have the upcurved apical area longer and narrower than in *P. carli* or in *P. angusta* and carry at nearly acute tip a very small, stiffened pad not a stiffened dorsal rim as in *P. carli* and not pointing apicad as in *P. angusta*.

Description.—Medium to large sized species; habitus as genus. Prosternal lobes near base compressed, afterwards long spiniform, thin; mesosternal lobes in basal area moderately wide, afterwards elongate conical to nearly cylindrical with obtuse tip; metasternal lobes compressed, with concave internal and convex external margins; gradually passing over into conical, nearly sub-cylindrical, apical area with obtuse tip (Fig. 2H).

Wings not reaching hind knees (Fig. 1B). Fore wings 2.9 × longer than wide. Venation: radius releases radius sector between middle and apical third of tegmen; media and cubitus anterior both with two branches each that fork from their undivided bases behind basal third of tegmen; cubitus posterior undivided; with four complete anal veins. Hind wings cycloid, distinctly wider than long (1.75 ×).

Legs. Fore coxa with a strong spine at swollen anterior surface; mid coxa with a smaller spine at anterior margin. Fore femur with 1–3 small spines and mid femur with 0–1 spine at anterior-ventral margins. Hind femora with 3–6 external and 3–6 internal small spines on ventral margins; hind tibiae with dorsal spines on inner margin larger than on outer margin, ventral margins with few minute spinules; on both sides with 4 apical spurs, the dorsal two pairs very large, the following pair medium, the ventral-most pair small; internal spurs larger than corresponding external counterparts; ventral margin with 2 external and 0–1 internal spinules.

Male. Subgenital plate with lateral margins slightly concave and narrowing posteriorly; apical margin subtruncate, both sides with a long substraight stylus (Fig. 2B). Paraproctal outgrowths with a rather long oblique-triangular projection from dorso-apical margin that carry at nearly acute tip a very small, stiffened pad; apical margin of outgrowth concave, ventro-apical angle rounded (Fig. 3E–I). Phallus membranous, shaped as in Fig. 7I–J.

Female unknown.

Coloration.—Different shades of brown, faintly spotted; head dark brown mixed with light and with black spots; pronotum and hind femora reddish-brown; hind knees dorsally very light brown; hind tibiae yellowish-brown. Face in different shades of brown, mixed with pale and black spots; pronotum and hind femora reddish-brown; hind knees dorsally ivory yellowish; hind tibiae yellowish-brown. Tegmen semi-transparent with black spots. Hind wings greyish, semi-transparent.

Measurements.—(3 males). In mm. Body w/wings: 45–47; body w/o wings: 35; pronotum: 9.7; tegmen: 33–38; tegmen width: 13; hind femur: 34; antenna: 80–90.

Etymology.—The new species is named for its narrow acute tip of the paraproctal outgrowths; from Latin *cuspis* spine, thorn; noun in apposition.

Pteranabropsis bavi sp. nov.

Figs 1G, 2K, 4N, 5G

<http://zoobank.org/DE4A28EC-B640-4932-8DFD-1A750F3D63AE>

urn:lsid:Orthoptera.speciesfile.org:TaxonName:505864

Holotype (female).—Vietnam: Hanoi prov., BaVi N.P., 21°4'4"N, 105°21'30"E, 25–29.vi.2015, leg. J. Constant & J. Bresseel (I.G.: 33.092) – (Brussels, ISNB).

Other specimens examined.—Same data as holotype, 1 female (paratype) (Brussels, ISNB).

Diagnosis.—A brachypterous species with wings reaching or slightly surpassing hind knees. The new species differs from all other species of the genus described so far by the shape of the female subgenital plate that has a distinct constriction of both lateral margins at the transition from the wider basal to the narrow apical area while in other species there is either a smooth transition or a faint slope of the surface or there are minute lateral grooves as in *P. copia* sp. nov. or *P. carnarius*. In general, habitus and wing shapes of *P. bavi* sp. nov. resemble *P. cuspis* sp. nov. and *P. angusta* sp. nov., both only known from males, while *P. bavi* sp. nov. is only known from females. From *P. angusta* it differs by the longer and thinner cylindrical apical area of the metasternal lobes, and from *P. cuspis* sp. nov. by wider tegmina and less reduced hind wings. Both other

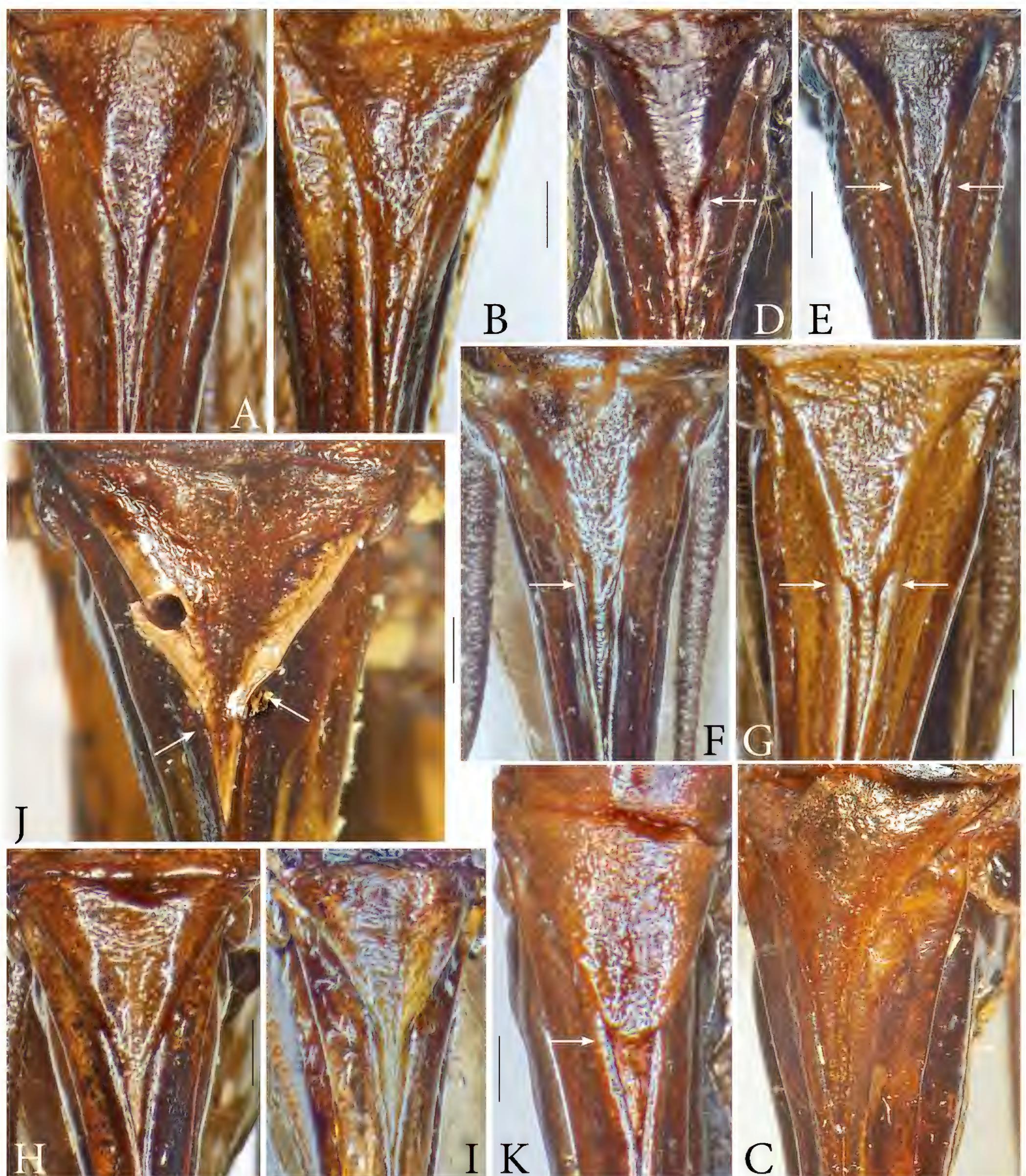


Fig. 5. Female subgenital plate of A–C. *P. carli* (Griffini, 1911) from Hoang Lien (A–B) and Tam Dao (C, in oblique view); D–F. *P. copia* sp. nov. from Hoang Lien (D–E) and Copia (F); G. *P. bavi* sp. nov.; H. *P. pusilla* sp. nov.; I. *P. guadun* sp. nov.; J–K. *P. carnarius* Gorochov, 1998 from Tam Dao (J) and from BaVi (K, abdomen laterally compressed). The white arrows point at the small lateral grooves, constrictions or faint steps of the subgenital plates. Scales 1 mm.

species occur in areas close to each other but remote from the locality of *P. bavi*.

Description.—Medium to large sized species; habitus as genus. Prosternal lobes near base compressed, afterwards long spiniform, thin; mesosternal lobes in basal area moderately wide, afterwards elongate conical to nearly cylindrical with obtuse to subtruncate tip; metasternal lobes compressed, with concave internal and convex external margins; gradually passing over into conical, nearly sub-cylindrical, apical area with obtuse tip (Fig. 2K).

Wings not or just reaching hind knees (Fig. 1G). Fore wings $2.6 \times$ longer than wide. Venation: radius with radius sector arising between middle and apical third of tegmen; media two-branched, branching before mid-length; cubitus anterior three-branched, branching before and behind mid-length (on left, folded tegmen, all three veins branching from a single point before mid-length); cubitus posterior undivided; with 5 anal veins, the last one incomplete. Hind wings cycloid, about $1.7 \times$ wider than long.

Legs. Fore coxa with a strong spine at swollen anterior surface; and mid coxa with a smaller spine at anterior margin. Fore femur with 1–3 small spines and mid femur with 3 spines at anterior-ventral margins. Hind femora with 1–5 external and 2–4 internal small spines on ventral margins; hind tibiae with dorsal spines on inner margin larger than on outer margin, ventral margins with few minute spinules; on both sides with 4 apical spurs, the dorsal two pairs very large, the following pair medium, the ventral-most pair small; internal spurs larger than corresponding external counterparts; ventral margin with 2 external and 1 internal spinules.

Male unknown.

Female. Subgenital plate acute-angled triangular in more than basal half, followed by a long spiniform posterior area; lateral margins distinctly constricted at transition between basal and apical areas (Fig. 5G).

Coloration.—Brown with lighter spots, fore and mid femora nearly black, all femora with ivory colored knees; hind femur to a variable extent with dorsal surface light ochre. Head: face blackish-brown with whitish-brown dots and flecks; clypeus, labrum and inner area of mandibles light brown with dark flecks to almost fully black; area around medial and lateral ocelli white, ocelli themselves brown; also anterior dorsal part of fastigium vetricis white but midline black; antennae yellowish, only scapus and clypeus black. Tegmen semi-transparent brown with dark spots, in anterior area lighter; hind wings semi-transparent grey, in anterior area brownish.

Measurements.—(2 females). In mm. Body w/wings: 48–50; body w/o wings: 33–37; pronotum: 10.5–11.5; tegmen: 35–37; tegmen width: 13.5; hind femur: 35; antenna: 80; ovipositor: 21.5.

Etymology.—The name of the new species refers to the type locality; noun in apposition.

Pteranabropsis copia sp. nov.

Figs 1C–E, 2C, 2I, 2M, 4A–D, 4L–M, 5D–F, 6S–V, 7G–H
<http://zoobank.org/B29BE0BA-E3E2-4341-8E4F-38204C1640A5>
[urn:lsid:Orthoptera.speciesfile.org:TaxonName:505865](http://urn.nbn.se/resolve?urn=urn:lsid:Orthoptera.speciesfile.org:TaxonName:505865)

Holotype (male).—Vietnam: Son La prov., Copia Nat. Res., $21^{\circ}22'12''N$, $103^{\circ}30'42''E$, 20–23.vii.2016, leg. J. Constant & J. Bresseel (GTI project, I.G.: 33.282) – (Brussels, ISNB).

Other specimens examined.—Vietnam: same data as holotype – 4 females, 2 males (paratypes) (Brussels, ISNB); Hoang Lien NP, $22^{\circ}21'N$, $103^{\circ}46'20''E$, 1–5.vii.2013, leg. J. Constant & J. Bresseel (I.G. 32.454) – 8 females (Brussels, ISNB).

Diagnosis.—A brachypterous species with wings that only slightly surpass the hind knees. In contrast to other brachypterous species of the genus, the fore wings of *P. copia* sp. nov. are rather wide ($2.2–2.4 \times$ longer than wide) and the spread hind wings are longer such that they look more like elongated semi-circles, while in most of the other species mentioned they are more ovoid. Moreover, *P. copia* sp. nov. differs from other similar species of the genus by the very narrow conical apical area of the metasternal lobes that arises in an almost step-like constriction from the wide basal area. The male paraproctal outgrowths of the new species resemble those of *P. cuspis* sp. nov., but the long dorsal process ends in a rather wide obtuse tip that carries a narrow stiffened rim, while in *P. cuspis* it ends in a subacute tip with minute stiffened pad. The female subgenital plate of *P. copia* is similar to that of *P. carli* but provided in the transient zone between the wide basal and the narrow apical area with small elongate lateral grooves such that the ventral surface of the plate in that area is narrower than the distance between the dorsal lateral margins.

Description.—Medium sized to moderately large species; general habitus as genus. Prosternal lobes near base compressed, afterwards long spiniform, thin; mesosternal lobes in basal area moderately wide, afterwards elongate conical to nearly cylindrical with obtuse tip; metasternal lobes compressed, with concave internal and strongly convex external margins; rather suddenly narrowed into nearly sub-cylindrical apical area with obtuse tip (Fig. 2I, M).

Wings slightly surpassing hind knees (Fig. 1C–E). Fore wings $2.2–2.4 \times$ longer than wide. Venation: radius with radius sector arising between middle and apical third of tegmen; media two-branched, branching before mid-length; cubitus anterior either three-branched, branching in basal third and behind mid-length, or two-branched, branching only in basal third; cubitus posterior free and undivided; with 5 anal veins, the last one incomplete. Hind wings nearly semicircular, about $1.4–1.55 \times$ wider than long.

Legs. Fore coxa with a strong spine at swollen anterior surface; mid coxa with a smaller spine at anterior margin. Fore femur with 1–4 small spines and mid femur with 0–3 spines at anterior-ventral margins; in one male, also with one spine at posterior margin of one mid femur only. Hind femur with 1–6 external and 1–6 small internal spines on ventral margins; hind tibia with dorsal spines on inner margin slightly larger than on outer margin, ventral margins with few minute spinules; on both sides with 4 apical spurs, the dorsal two pairs very large, the following pair medium, the ventral-most pair small; internal spurs larger than external counterparts; ventral margin with 2–3 external and 1 internal spinules.

Male. Paraproctal outgrowths elongate, narrowest in middle, at end with rounded ventral angle, substraight but slightly oblique apical margin and elongate-triangular dorsal process, slightly tilting posteriorly and with truncate tip that carries on top a narrow stiffened lamella (Fig. 4A–D). Subgenital plate in widened basal area only slightly swollen; apical area with subparallel lateral margins that very faintly diverge posteriorly; apical margin substraight but concave in middle; elongate styli inserted at apico-lateral angles (Fig. 2C). Phallus membranous (Fig. 7G–H).

Female. Subgenital plate acute-angled triangular in more than basal half, terminating into a long apical spine with regularly con-

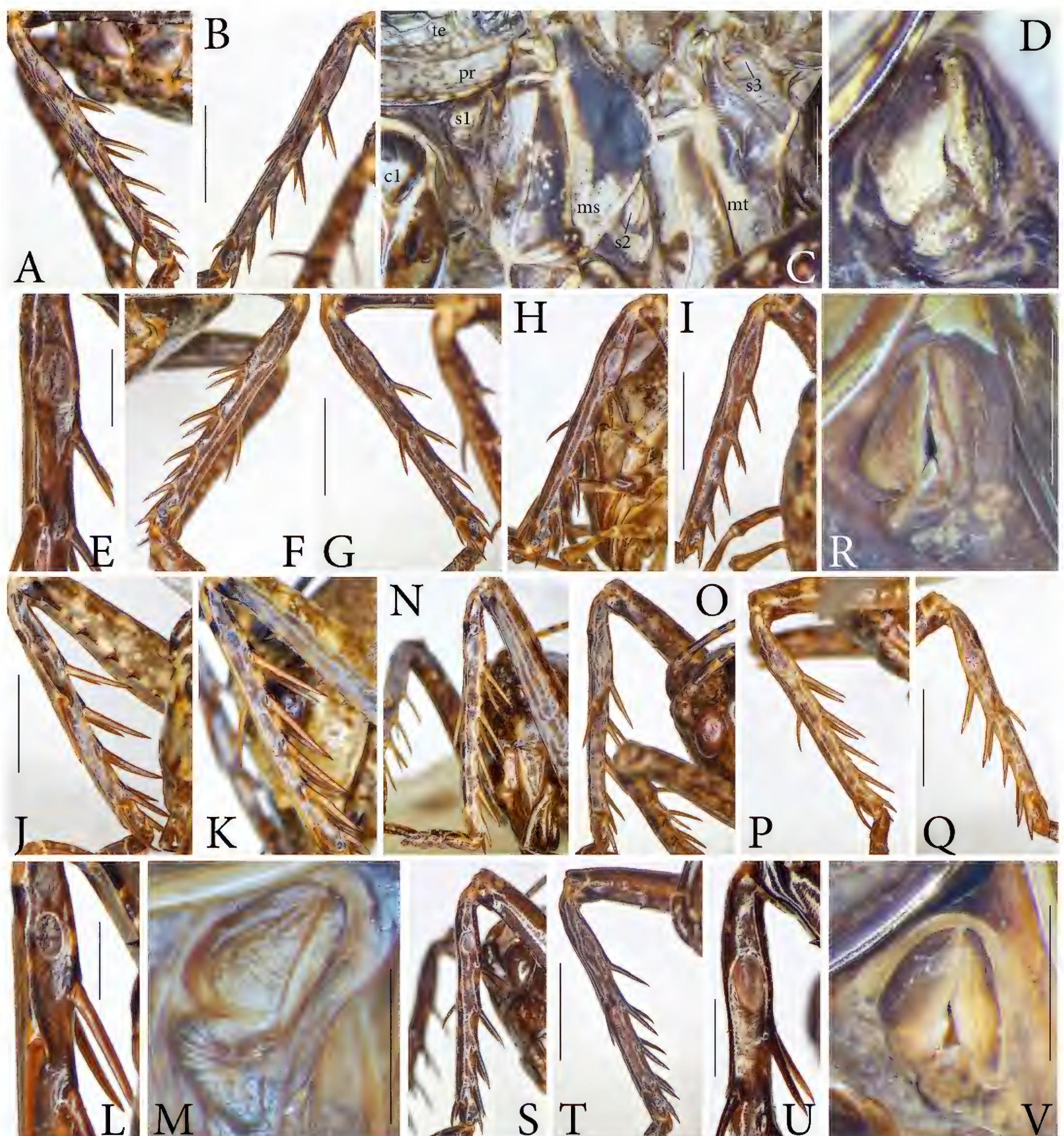


Fig. 6. A–E. *P. carli* (Griffini, 1911) male from Ngo Luong (A–D) and Tam Dao (E); F–G. *P. cuspis* sp. nov. male; H–I. *P. angusta* sp. nov. male; J–M. *P. carnarius* Gorochov, 1998 male (J) and female from Tam Tao (K–L) and from BaVi (M); N–O. *P. pusilla* sp. nov. female; P–R. *P. guadun* sp. nov. female; S–V. *P. copia* sp. nov. female (S–T) and male (U–V) from Copia. – Fore tibia external side (A, F, H, K, N, P, S) and internal side (B, E, G, I–J, L, O, Q, T); thorax in lateral view (C), prothoracic spiracle (D, M, R, V). Abbreviations: c1 – anterior coxa, ms – mesothoracic pleurites, mt – metathoracic pleurites, s1–s3 – first, second and third thoracic spiracles. Scales for legs and body, 5 mm; for tympana and spiracles, 1 mm.

verging margins to acute tip; at transition between basal and apical areas with a small elongate groove on both sides (Fig. 5D–F).

Coloration.—Different shades of brown with light and dark brown mottling; head dark brown with light spots; pronotum and hind femora of similar color; hind femora towards apical area indistinctly lighter. Head: face blackish-brown with numerous small and few larger whitish-brown dots, also on scapus; clypeus, labrum and inner area of mandibles more uniformly medium or dark brown. Tegmen semi-transparent brown with indistinct dark spots, along anterior margin lighter; hind wings semi-transparent grey-brown, in anterior area clear, subtransparent.

Measurements.—(3 males, 4 females from Copia). In mm. Body w/ wings: male 48–50, female 46–50; body w/o wings: male 27–31, female 28–35; pronotum: male 6.8–8.0, female 7.5–8.5; tegmen: male 36–38, female 32–37; tegmen width: male 15.5–16.5, female 14.0–15.5; hind femur: male 28.5–29.0, female 27–30; ovipositor: female 19.5–23.0. Index tegmen length : width male 2.24–2.45, female 2.21–2.40.

Measurements.—(8 females from Hoang Lien). In mm. Body w/ wings: female 39–45; body w/o wings: female 28–32; pronotum: female 7.8–8.2; tegmen: female 30–33; tegmen width: female 14; hind femur: female 26–28; ovipositor: female 18–20.

Etymology.—The name of the new species refers to the type locality; noun in apposition.

Pteranabropsis carnarius Gorochov, 1998

Figs 1J, 2E, 2N, 4E–G, 5J–K, 6J–M, 7O–P

urn:lsid:Orthoptera.speciesfile.org:TaxonName:20139

Specimens examined.—Vietnam: Hanoi prov., BaVi N.P., 21°4'4"N, 105°21'30"E, 25–29.vi.2015, leg. J. Constant & J. Bresseel (I.G.: 33.092) – 2 females (Brussels, ISNB); Prov. Vinhfu, Tam Dao N.P., 21°31'N, 105°33'E, 25–30.vii.2011, leg. J. Constant & J. Bresseel (I.G. 31.933) – 1 female, 2 males (Brussels, ISNB).

Diagnosis.—In general characters, *P. carnarius* differs from all other species of the genus that I have studied by the wide fore wings, the dark colored hind wings, and by the very long and distinctly curved ventral spines of the fore tibia; the longest of these spines are more than three times (3.3 ×) longer than the width of the tibia while in the other species the longest spines are more than two times longer than the tibia width but shorter than three times (2.2–2.8 ×) and are only slightly curved or substraight. In sex-specific characters, males differ from other species by the paraproctal outgrowths that have the pre-apical area bulging ventrally and then are gradually narrowed to the tip that carries a small stiffened obtuse pad. Females have the subgenital plate wide at base with rather strongly narrowing, substraight lateral margins, and the narrow apical area short, about half the length of the wide anterior area.

Description.—Large species; habitus as genus. Prosternal lobes near base compressed, afterwards long spiniform, thin; mesosternal lobes in basal area moderately wide, about between basal half and basal two thirds compressed, afterwards tubular with obtuse

or subtruncate tip; metasternal lobes compressed triangular with faintly concave internal and strongly convex external margins, towards tip swollen conical with obtuse tip; without narrow cylindrical apical area (Fig. 2N).

Wings distinctly surpassing hind knees (Fig. 1J). Fore wings 2.0–2.23 × longer than wide. Venation: radius with radius sector arising behind mid-length of tegmen; media two-branched, branching behind basal third; cubitus anterior three-branched, branching in basal third and behind mid-length; cubitus posterior undivided, at base running very close to first analis; with 5–6 anal veins, the last one incomplete; the first and second anal veins with a short common base; the second vein branching again into 2 veins in subbasal area (thus 6–7 anal veins). Hind wings nearly semicircular, only slightly wider than long (about 1.3 ×).

Legs. Fore coxa with a strong spine at swollen anterior surface; mid coxa with a smaller spine at anterior margin. Fore femur with 5–6 small spines and mid femur with 3–5 spines at anterior-ventral margins, mid femur also with 3–6 posterior-ventral spines. Hind femur with 4–7 external and 2–3 internal small spines on ventral margins; hind tibia with dorsal spines on inner margin slightly larger than on outer margin, ventral margins with few minute spinules; on both sides with 4 apical spurs, the dorsal two pairs very large, the following pair medium, the ventral-most pair small; internal spurs larger than corresponding external counterparts; ventral margin with 3 external and 1 internal spinules.

Male. Paraproctal outgrowths elongate, in subapical area slightly but distinctly widening, somewhat curved dorsad and with converging margins towards subacute tip; at tip provided with a tiny, compressed, obtuse pad (Fig. 4E–G). Subgenital plate in about basal half slightly swollen with convex and approaching lateral margins [in Fig. 2E, barely expressed from freshly molted specimen with still soft cuticula when captured]; in apical half with subparallel or faintly diverging lateral margins which towards tip form rounded lateral carinae, at tip with insertion of stylus; otherwise apical area compressed with apical margin subtruncate, interrupted by a deep incision with rounded bottom. Phallus membranous (Fig. 7O–P).

Female. Subgenital plate wide at base, triangularly narrowing posteriorly and terminating into a short spiniform apical area; basal area nearly twice as long as apical area, faintly sloping in transition zone between both areas (Fig. 5J). In a female from BaVi the baso-lateral areas are curved dorsad, giving the impression of a narrower plate, and the transition zone more strongly expressed (Fig. 5K).

Coloration.—General color light brown, mixed with dark pattern; pronotum light brown to ochre, with or without some darker elements; legs spotted with light and darker flecks. Head: face yellowish-brown with dark spots; clypeus and labrum brown, mouthparts of same color; below median ocellus and at clypeo-frontal suture with black spots, in some individuals also clypeus darkened; antennae in basal area black with white annulation, behind about basal quarter gradually getting lighter towards tip. Tegmen light, semi-transparent with dark brown or nearly black spots; hind wings bright medium to dark brown, along margin transparent, in anterior area semi-transparent with some dark spots along margin; in anterior area of the dark field with few scattered whitish, transparent spots.

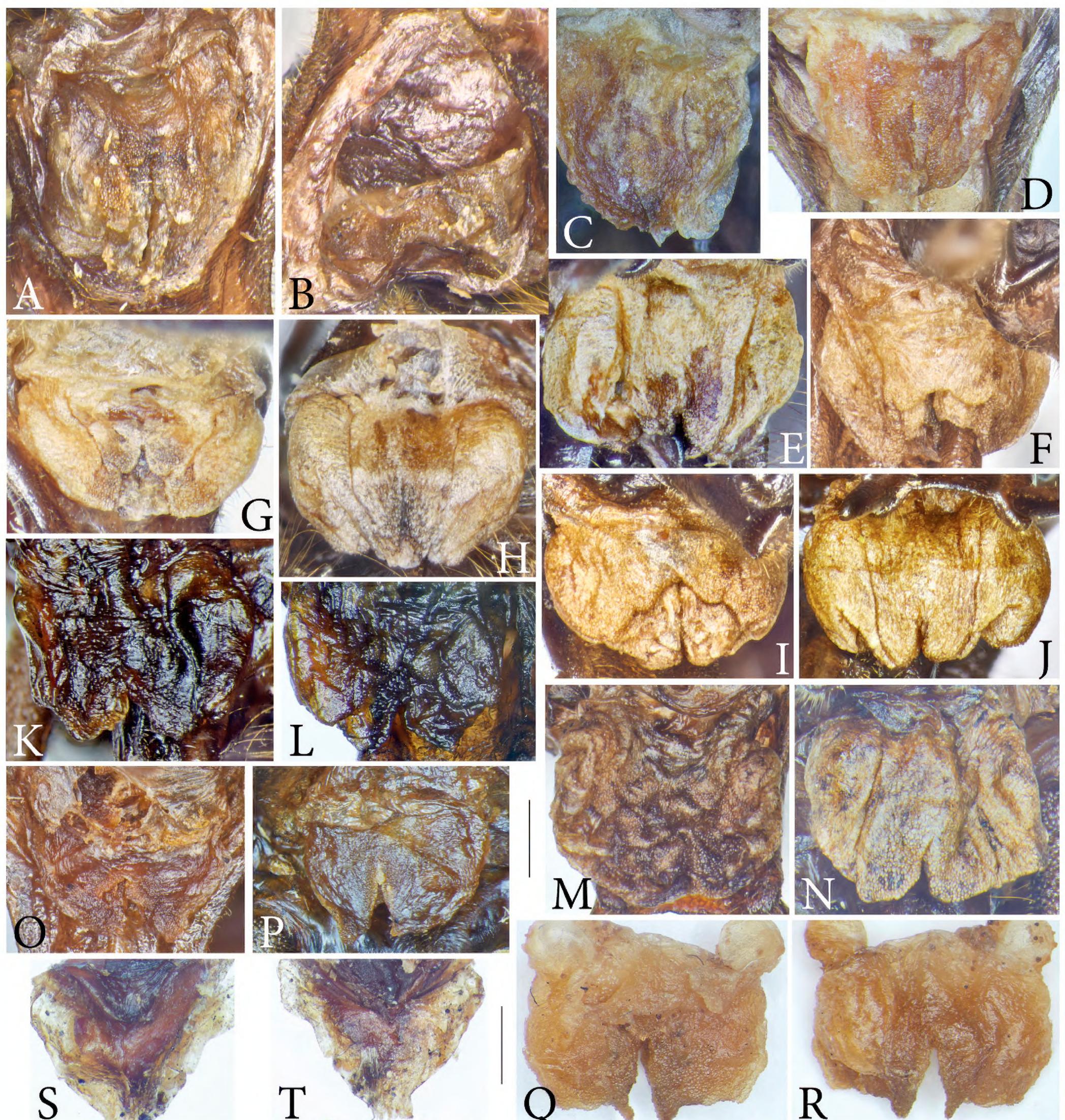


Fig. 7. Male phallic complex of A–F. *P. carli* (Griffini, 1911) from Tam Dao (A–B), Cuc Phuong (C–D) and Ngo Luong (E–F); G–H. *P. copia* sp. nov.; I–J. *P. cuspis* sp. nov.; K–N. *P. angusta* sp. nov.; O–P. *P. carnarius* from Tam Tao; Q–R. *P. pusilla* sp. nov.; S–T. *P. guadun* sp. nov. in dorsal (A, C, E, G, I, L, M, O, Q, S) and in ventral (D, E, H, J, K, N, O, R, T) view, or in dorsal view with only dorsal lobes flipped proximad, ventral lobe distad (B). Scales 1 mm (all images).

Measurements.—(2 males, 3 females). In mm. Body w/wings: male 60–63, female 58–62; body w/o wings: male 36–37, female 38–40; pronotum: male 9.5–10.3, female 10.0–10.5; tegmen: male

45–46, female 44–49; tegmen width: male 21–23, female 20–22; hind femur: male 27–30, female 29–32; antenna: male 90, female 100; ovipositor: female 29–31.

Pteranabropsis pusilla sp. nov.

Figs 1I, 2F, 2O, 4H–I, 5H, 6N–O, 7Q–R

<http://zoobank.org/5C6B62DA-413C-49EB-B19C-95190CED3C38><urn:lsid:Orthoptera.speciesfile.org:TaxonName:505866>

Holotype (male).—Vietnam: Hoang Lien NP, 22°21'N, 103°46'20"E, 1–5.vii.2013, leg. J. Constant & J. Bresseel (I.G. 32.454) – (Brussels, ISNB).

Other specimens examined.—Same data as holotype, 1 female (paratype) (Brussels, ISNB).

Diagnosis.—In contrast to the other brachypterous species described in this paper, *P. pusilla* sp. nov. is related to *P. carnarius* Gorochov, 1998 with regard to the male paraproctal outgrowths, the shape of the phallus, and the shape of the female subgenital plate. It differs by smaller size, the grey semitransparent instead of dark brown hind wings, the tibial spines that are less curved and distinctly shorter, the longest tibial spines is only more than twice as long as the width of the diameter of the fore tibia instead of more than three times that width, and the metasternal lobes being narrower at tip. The paraproctal outgrowths of *P. pusilla* are much less widened in subapical area than in *P. carnarius*, have the tip obtuse instead of subacute, and carry only a minute stiffened pad at tip. The female subgenital plate of the new species is similar to that of *P. carnarius* but the narrow apical area is even shorter than in the latter species: less than half the length of the anterior area instead of about half or slightly more than half of that length.

Description.—Medium to large sized species; habitus as genus. Prosternal lobes near base compressed, afterwards long spiniform, thin; mesosternal lobes in basal area wide, afterwards thin tubular with obtuse tip; metasternal lobes rather short, compressed triangular with faintly concave internal and moderately convex external margin, towards tip short-conical with obtuse tip (Fig. 2O).

Wings in male distinct, in female slightly surpassing hind knees. Fore wings 2.4–2.6 × longer than wide (Fig. 1I). Venation: radius with radius sector arising at beginning of apical third of tegmen; media free, two-branched, branching before mid-length; cubitus anterior three-branched, branching before mid-length and before apical third; cubitus posterior undivided; with 5 anal veins, the last one incomplete. Hind wings nearly semicircular, only slightly wider than long (about 1.35 ×).

Legs. Fore coxa with a strong spine at swollen anterior surface and a blunt tooth at ventro-posterior margin; mid coxa with a smaller spine at anterior margin. Fore femur with 1–4 and mid femur with 2–3 spines at anterior-ventral margins; in one female also with 1–2 spinules on posterior-ventral margin. Hind femur with 5–6 external and 3 internal small spines on ventral margins; hind tibia with dorsal spines on inner margin larger than on outer margin, ventral margins with few minute spinules; on both sides with 4 apical spurs, the dorsal two pairs very large, the following pair medium, the ventral-most pair small; internal spurs larger than corresponding external counterparts; ventral margin with 1 external and 3 internal spinules.

Male. Paraproctal outgrowths long, roughly cylindrical with setose and warty internal surface, in about mid-length faintly constricted, in subapical area only faintly widening and slightly curved dorsad, apex obtuse but with a tiny compressed pad at tip (Fig. 4H–I). Subgenital plate in basal two thirds with convex surface and approaching lateral margins; disc in apical half with

rounded lateral carinae, first approaching, afterwards diverging, at tip with insertion of stylus; apical margin transverse substraight, interrupted by a deep incision with rounded bottom (Fig. 2F). Phallus membranous (Fig. 7Q–R).

Female. Subgenital plate wide at base, triangularly narrowing posteriorly and terminating into a short spiniform apical area; basal area nearly twice as long as apical area, slightly sloping in transition zone between both areas (Fig. 5H).

Coloration.—General color light yellowish-brown with dark mottling. Head: face yellowish-brown to light ochre, with or without black flecks; along clypeo-frontal suture with 4 black spots; clypeus brown; below antennal scrobae and on genae with dark spots; vertex mostly black; ocelli white; antennal flagellum in more basal area black with white annulation, farther behind paler. Pronotum brown; anterior margin black, toward sides with white annulation (male) or with alternating black and yellow spots (female). Tegmen light semi-transparent with dark brown spots; hind wings semi-transparent grey, in anterior area light with brown spots.

Measurements.—(1 male, 1 female). In mm. Body w/wings: male 47, female 43; body w/o wings: male 25, female 27; pronotum: male 8.1, female 7.8; tegmen: male 40, female 34; tegmen width: male 16.5, female 13; hind femur: male 24.5, female 25.0; ovipositor: female 23.5.

Etymology.—The name of the new species refers to its smaller size compared to the related species *P. carnarius*; from Latin *pusillus*, *pusilla* of small size.

Pteranabropsis guadun sp. nov.

Figs 1H, 2G, 2P, 4J–K, 4O, 5I, 6P–R, 7S–T

<http://zoobank.org/CA794A7E-4AC5-4746-93E0-0E4383BEF373><urn:lsid:Orthoptera.speciesfile.org:TaxonName:505866>

Holotype (male).—China: Fujian, Wuyishan, Kuatun [Guadun], elev. 2300 m, 27°40'N, 117°40'E, 4.ix.1938, leg. J. Klapperich – (Bonn, ZFMK).

Other specimens examined.—Same locality as holotype, 31.vii.1938, leg. J. Klapperich, 1 female (paratype) (Bonn, ZFMK).

Diagnosis.—The male subgenital plate and paraproctal outgrowths of the new species are similar to those of *Pteranabropsis infuscatus* Wang et al., 2015; it differs by larger size, longer wings and longer ovipositor, by the metasternal plates that are roughly triangular without short conical tip instead of with conical tip in *P. infuscatus*. The female subgenital plate is similar in both species but in *P. guadun* sp. nov. has the narrow apical area for the greatest basal part rather wide and stout with parallel lateral margins and suddenly distinctly narrowed before tip instead of apical area regularly narrowed to tip.

Description.—Medium to large sized species; habitus as genus. Prosternal lobes near base compressed, afterwards long spiniform, thin; mesosternal lobes in basal area wide, afterwards thin tubular with obtuse tip; metasternal lobes compressed triangular with faintly concave internal and convex external margins, towards tip swollen conical with obtuse tip; without narrow, roughly cylindrical area (Fig. 2P).

Wings distinctly surpassing hind knees (Fig. 1H). Fore wings 2.21–2.23 × longer than wide. Venation: radius with radius sector

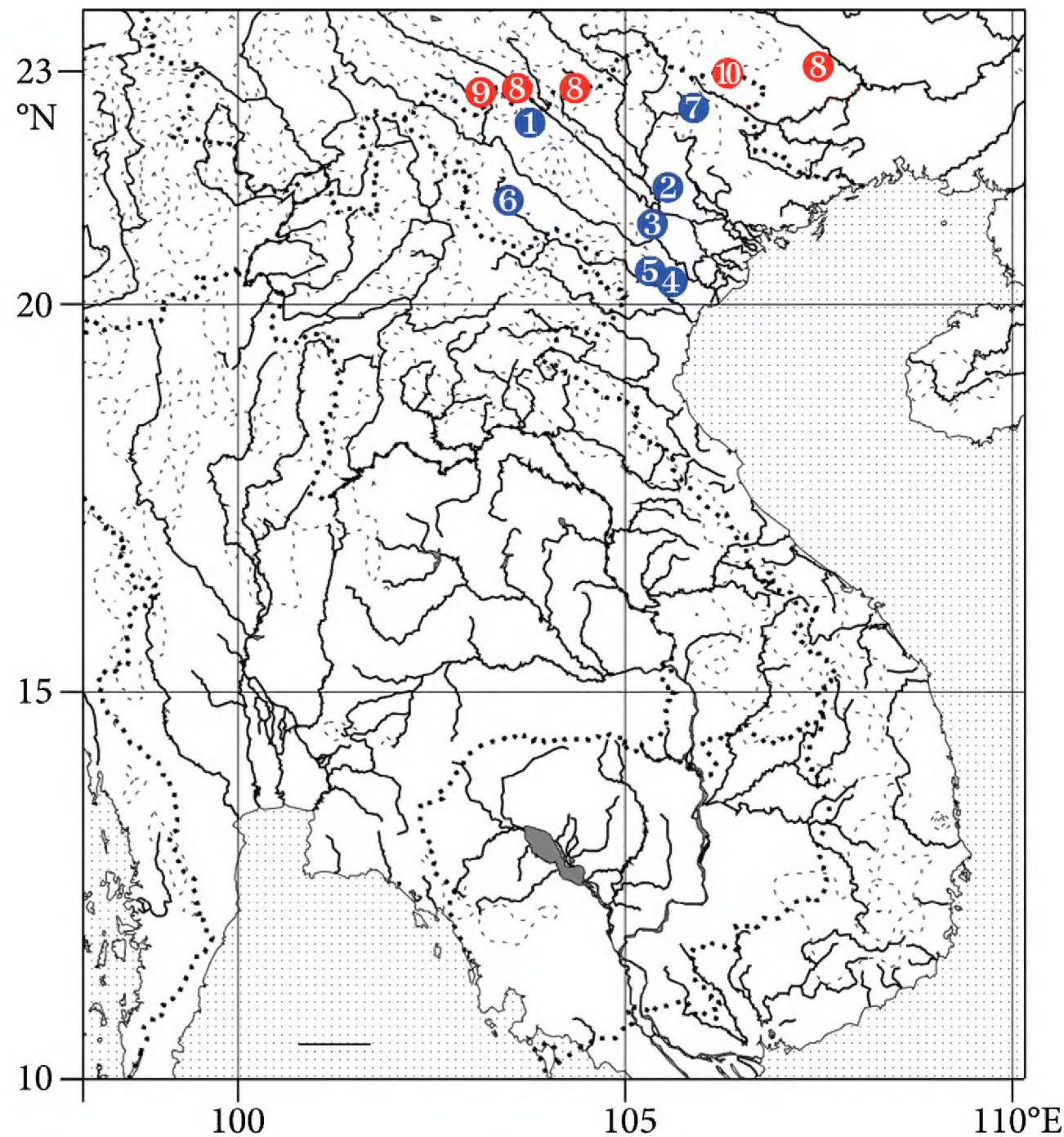


Fig. 8. Distribution of the genus *Pteranabropsis* in Vietnam (blue points 1–7) and some localities in southern China (red points 8–10, after Song et al. 2016): 1. Hoang Lien N.P. (*P. carli* (Grif.), *P. copia* sp. nov., *P. pusilla* sp. nov.); 2. Tam Dao N.P. (*P. carli*, *P. carnarius* Gor.); 3. BaVi N.P. (*P. bavi* sp. nov., *P. carnarius*); 4. Cuc Phuong N.P. (*P. carli*, *P. angusta* sp. nov.); 5. Ngo Luong Nat. Res. (*P. carli*, *P. cuspis* sp. nov.); 6. Copia Nat. Res. (*P. copia*); 7. Phia Den (*P. carli*); 8. Localities of *P. carli*; 9. Locality of *P. crenatis* Song et al.; 10. Locality of *P. karnyi* Wang et al. Scale 100 km.

arising between middle and apical third of tegmen; media two-branched, branching between basal third and mid-length; cubitus anterior three-branched, branching before end of basal third and just before (male) or behind (female) mid-length; cubitus posterior free and undivided; with 5(–6) anal veins, the last one or two incomplete. Hind wings nearly semicircular, only slightly wider than long (about 1.3 ×).

Legs. Fore coxa with a strong spine at swollen anterior surface; mid coxa with a smaller spine at external margin. Fore femur with 4 (female) or 1 (male) small spines and mid femur with 3–4 (female) or 1 (male) spines at anterior-ventral margins, in the female only also with 0–1 spinules at posterior-ventral margin of mid femur. Hind femur with 2–5 external and 2–3 internal small spines on ventral margins; hind tibia with dorsal spines on inner margin slightly larger than on outer margin, ventral margins with few minute spinules; on both sides with 4 apical spurs, the dorsal two pairs very large, the following pair medium, the ventral-most pair small; internal spurs larger than corresponding external counterparts; ventral margin with 3 external and 1 internal spinules.

Male. Paraproctal outgrowths forming a long roughly cylindrical process with setose surface, slightly curved dorsad in subapical area, apex obtuse but with a small compressed pad at tip (Fig. 4J–K). Subgenital plate in about little more than basal half with

convex surface and approaching lateral margins; in somewhat less than apical half with faintly diverging lateral margins that, towards tip, form rounded lateral carinae that are slightly diverging posteriorly, at tip with insertion of stylus; otherwise apical area compressed with apical margin subtruncate and slightly oblique on both sides, interrupted by a V-shaped incision (Fig. 2G). Phallus membranous, not well preserved in holotype (Fig. 7S–T).

Female. Subgenital plate wide at base, triangularly narrowing posteriorly and terminating into a spiniform apical area that is distinctly longer than in *P. carnarius*, almost as long as the wide basal area and with sub-parallel lateral margins except for apical third with converging margins to acute tip (Fig. 5I).

Coloration.—General color medium brown, mixed with dark pattern; pronotum dark brown; legs marbled with light and darker flecks. Head: face light yellowish-brown with larger, indistinctly darker flecks and with smaller dark spots. Pronotum uniformly medium brown with light yellowish-brown rim. Tegmen light semi-transparent with dark brown spots; hind wings light semi-transparent with dark brown spots.

Measurements.—(1 male, 1 female). In mm. Body w/wings: male 53, female 55; body w/o wings: male 29, female 30; pronotum:

male 8.3, female 8.3; tegmen: male 41, female 42.5; hind femur: male 26, female 27; tegmen width: male 18.5, female 19; antenna: male 85, female 65; ovipositor: female 23.

Etymology.—The name of the new species refers to the type locality; noun in apposition.

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